The Effectiveness of the Porch Index of Communicative Ability as a Diagnostic Tool in Assessing Specific Behaviors of Senile Dementia

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Introduction. Senile dementia and Alzheimer's disease, although named separately, are recognized today by neuropathology as the same progressive neurological disease. The only differentiation between the two is age at onset. Alzheimer's disease is the diagnosis if onset occurs before age 65, while senile dementia is the diagnosis if onset occurs after age 65. Histopathological studies have consistently indicated that the brains of senile dementia and Alzheimer's disease patients exhibit the same neurofibrillary tangles, senile plaques, and granulovacuolar degeneration. Atrophy of the brain surface, widening of sulci and dilation of the ventricles occurs. The brain takes on the classic "walnut shape" appearance. Although cerebral degeneration is widespread, particular concentration occurs in the limbic structures, the basal portions of the temporal lobe, the temporo-parieto-occipital cortex, and the posterior cingulate gyrus. Clinical symptoms include acute short-term memory loss and impairment of intellectual functioning.

Language disturbances are not uncommon but generally are recognized later in the course of the disease. Benson described the speech in moderate to advanced cases as "rambling, circumlocutory output, indicating emptiness and lack of cohesiveness." He also noted low tolerance for distraction, concrete rather than abstract patterns of thought, and necessity of frequent cues to complete a task.

In recent years, neurologists have demonstrated increased interest in diagnostic procedures for Alzheimer's disease or senile dementia. Particular focus has included differentiating the "normal" aging process from the disease process, as well as early detection of Alzheimer's disease for the most effective medical intervention.

The diagnosis of senile dementia or Alzheimer's disease is the result of clinical evaluations and diagnostic tests. The clinical evaluation has included psychological testing of intellectual and cognitive functioning. Although this usually consisted of informal reading and copywork tasks, complex and structured examinations such as the Weschler Adult Intelligence Test have been used. It became evident that an efficient evaluation of the communicative abilities might assist early detection of Alzheimer's disease or senile dementia. While developing the PICA, Dr. Porch tested a group of patients with bilateral brain damage, and constructed a distinct profile. The purpose of this two-part study was to compare the behaviors of senile dementia or Alzheimer's disease to this profile, and determine additional response patterns specific to senile dementia or Alzheimer's disease.

The purpose of Part I was to determine if there was a significant difference in scores between patients with senile dementia or Alzheimer's disease and patients with left hemispheric cerebral vascular accidents when both groups were tested with the PICA.

Procedure. Subjects consisted of 24 patients, 12 of whom had a confirmed diagnosis of left cerebral vascular accident (left CVA), and 12 of whom had a clinical or confirmed diagnosis of senile dementia or Alzheimer's disease (dementia). Following the referral from a physician, each subject was tested with the PICA. In order to be included in the study, each subject was required to be alert and able to tolerate the testing procedure.

Results. The results of t-tests comparing the means per subtest for each group were significant for all the verbal and graphic subtests. In each case, the dementia group performed better. The results of a t-test comparing the variance of mean subtest scores around the mean overall score between each group were significant. The results indicated that the variance of the subtest scores around the overall communicative score for dementia patients did not generally exceed that of left CVA patients.

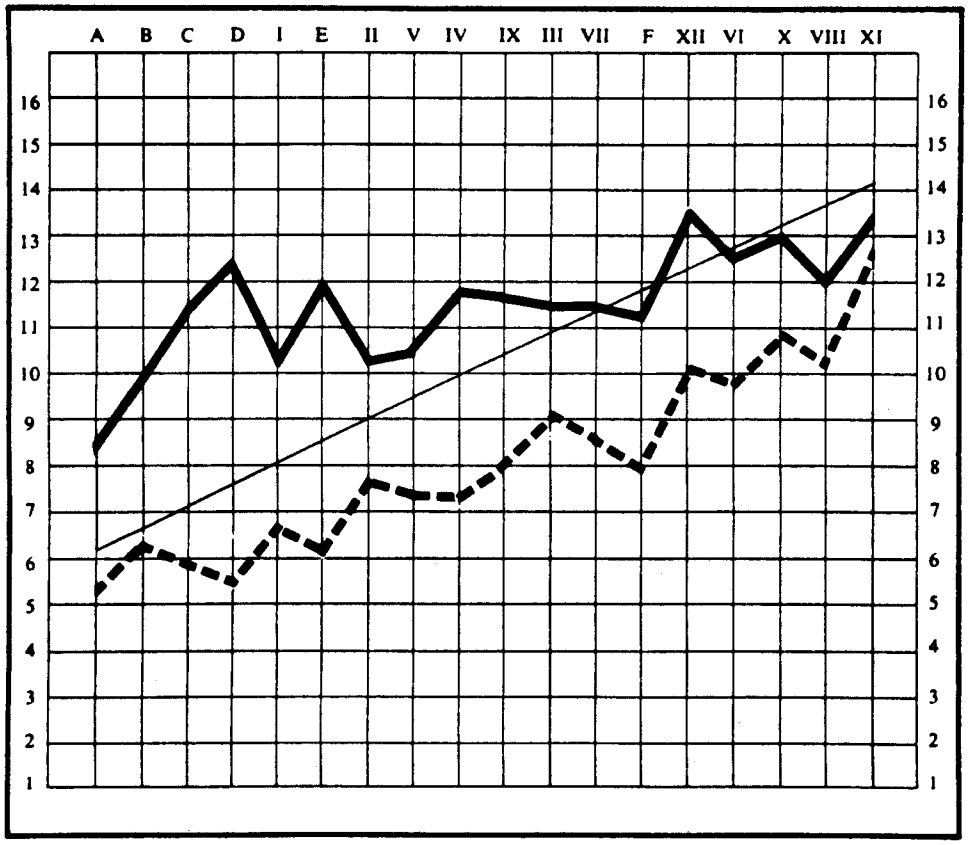


Figure 1. The Ranked Response Comparison of Mean Scores Between Dementia Patients and Left-CVA Patients.
——— Dementia ------ Left-CVA

Figure 1 illustrates the ranked response comparison of mean scores between the dementia patients and the left CVA patients. Visual inspection shows greater variance and lower performance among subtest scores for the left CVA group than the dementia group. Scores within the left CVA group ranged from 5.2 to a high of 12.8, while scores within the dementia group ranged from 8.4 to 13.5.

A particular difference between the two groups was apparent in the graphic modality. Subtests C and D were auditorily stimulated, and E and F were visually stimulated. Dementia patients declined in performance during the visual subtests while left CVA patients improved performance during the same visual subtests.

PART II

The purpose of Part II was to determine the effectiveness of the PICA in identifying and assessing behaviors of patients with senile dementia or Alzheimer's disease in contrast to patients with left cerebral vascular accidents.

Procedure. The PICA was administered to 20 patients with confirmed left CVA and 20 patients with a clinical or confirmed diagnosis of senile dementia or Alzheimer's disease. All patients were alert and able to undergo standard testing procedures.

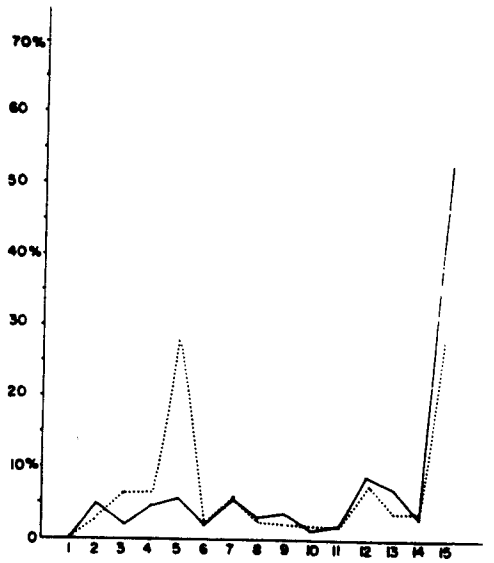
Results. A frequency distribution was completed, computing the total frequency of occurrence for each score within each group, illustrated by Figure 2. The most distinctive score frequency for dementia was 15, comprising 52.4% of the total responses for this group. The CVA group did not have a score with a frequency of more than 27.2% of the total. The pattern of score frequency for dementia proceeded from 15 to 12, 13, 7, 5. The pattern for CVA proceeded from 5 to 15, 4, 12, 3, indicating a difference between the two groups. Within the dementia group, 3 of the most frequent scores occurred in the mild to no deficit level of performance. This was very different from the CVA group, in which 3 of the most frequent 5 scores occurred in the severe deficit level of performance.

A comparison was made between the two groups in regard to performance on auditory subtests versus visual subtests. Auditory subtests selected for the study included:

VI and X	identification of objects by function and name
IX and XII	naming objects by function and object name
C and D	writing object names from name and spelling to dictation

Visual subtests selected for the study included:

V and VII	identification of objects from written function and name
VIII and XI	matching pictures and objects to corresponding objects
E and F	copywork of printed names and geometric shapes



GROUP I SCORE	15	12	13	7	5	4	2	9	8	14	3	6	11	10	1
% OF TOTAL	52.4	8.8	6.5	6.1	5.0	4.6	4.3	3.5	2.6	2.3	1.5	1.1	.7	.6	0
GRADUATED %	52.4	61.2	67.7	73.8	78.8	83.4	85.7	91.2	93.8	96.1	97.6	98.7	99.4	100	
GROUP II SCORE	5	15	4	12	3	7	13	14	2	8	9	6	11	10	1
% OF TOTAL	27.2	26.1	7.6	7.0	6.8	6.6	4.2	4.0	2.3	2.1	1.9	1.7	1.5	1.1	0
GRADUATED %	27.2	53.3	60.9	67.9	74.7	81.3	85.5	89.9	91.8	93.9	95.8	97.5	99	100	

Figure 2. A Frequency Distribution of PICA Scores for Dementia Patients and Left-CVA Patients.

Results of this comparison offered a general and specific difference between the two groups, as illustrated by Figure 3. The dementia group, illustrated in black dots, performed consistently better on auditory tasks than on visual tasks. The CVA group, superimposed on the stripes in black, performed better on visual tasks than on auditory tasks. Specifically note the decline in performance for dementia on the abstract reading task, and copywork of geometric forms. The CVA group, in contrast, improved at F. Matching objects to objects was the highest scoring task for both groups, and therefore, although this is a visual test, the two groups could not be distinguished here.

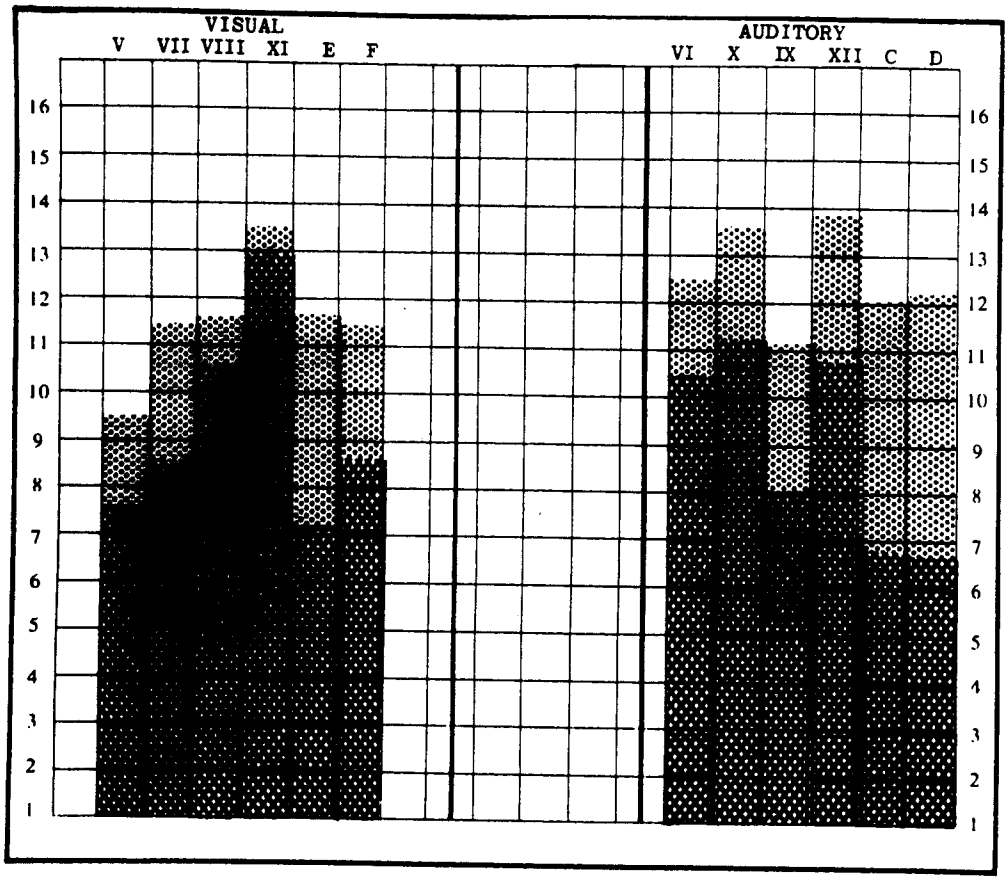


Figure 3. A Comparison Between Dementia Patients and Left-CVA Patients on Auditory Subtests and Visual Subtests.

Figure 4 illustrates the modality mean curve for the dementia group, and Porch's aphasic profile at the 50 percentile. A very distinct difference can be noted in the graphic modality. Note the decline by dementia patients during copywork tasks. The other noticeable decline occurred at V, abstract reading. High level performance was apparent at VIII, X, and XI.

To construct the most accurate dementia profile, observation of Porch's percentile for bilateral brain damage was helpful (Figure 5). The top two lines, 90 and 99 percentiles, show the same pattern as the dementia curve. For the gestural and verbal modalities, the 90 percentile was appropriate. The important decline seen here occurred during the abstract reading task. Otherwise, performance level was very high. For the graphic modality, the 99 percentile was used. Note the decline on the copywork of geometric forms. For dementia patients, this may be the only task which indicates a deficit.

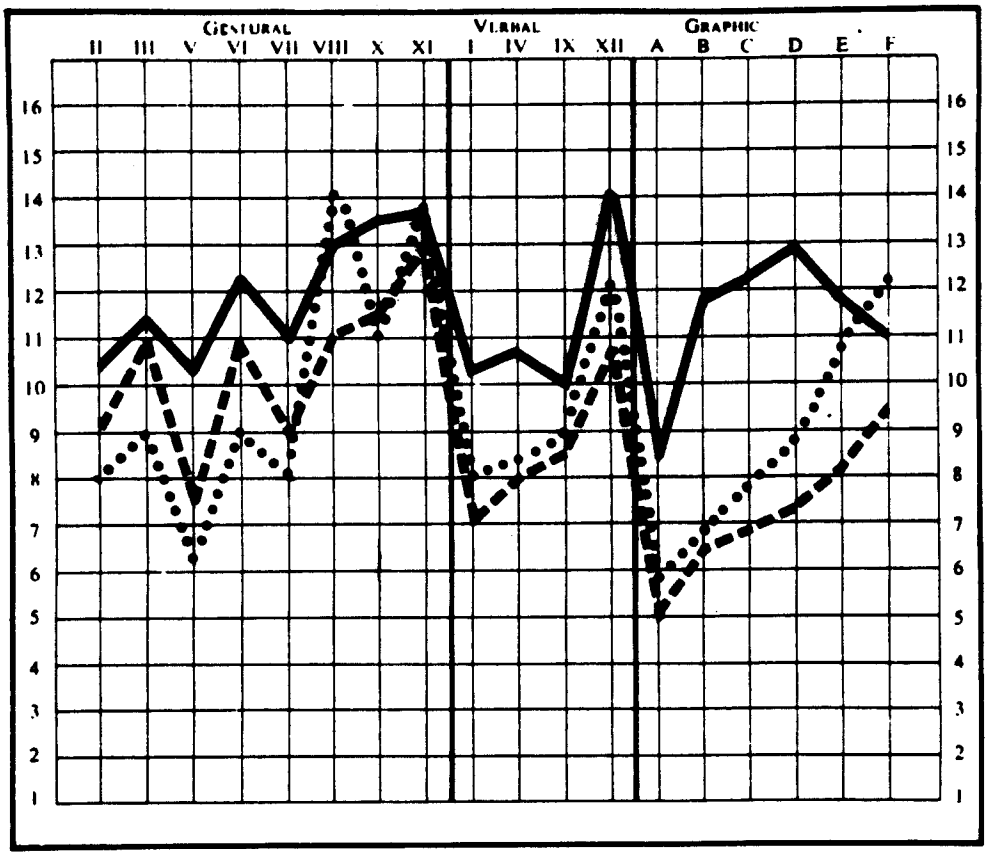


Figure 4. The Modality Mean Curve Comparison Between Dementia Patients and Left-CVA Patients.

———— Dementia -------- Left-CVA
..... 50 Percentile Aphasic Profile (Porch)

Summary. The results of Part I and Part II of the study demonstrated specific response patterns of patients with senile dementia or Alzheimer's disease. The modality response curve for the two dementia groups is illustrated by Figure 6. There were no measurable differences between the two curves. Significant declines in performance occurred at subtests V, abstract reading, and E and F, copywork.

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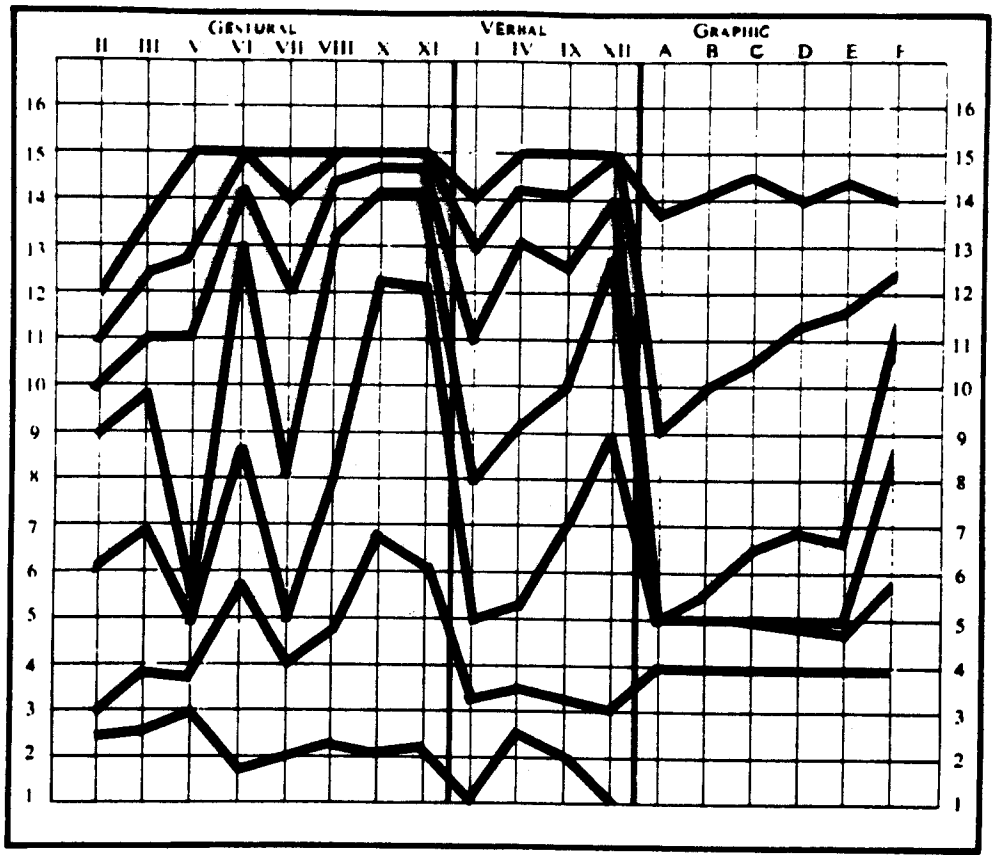

Figure 5. The Percentile Profile of Bilaterally Brain Damaged Patients (Porch).

The frequency distribution, Figure 2, illustrated that the concentration at 15 was 52.4% of the total dementia scores. The progression of scores in frequency was 15, 12, 13, 7, 5. Observing the quality of responses which were assigned these scores, it became apparent that the majority of responses were appropriate, but became less and less complete, as the disease severity increased. Speech became circumlocutory with increasing numbers of words and decreasing content.

Performance of dementia patients on auditory subtests was better than performance on visual subtests. Dr. Porch noted the performance of bilaterally brain damaged patients to be better on VI and X than on VII and XI. It was important to note that in the case of dementia patients, the visual perceptual deficit was not always apparent in these subtests. The initial decline in performance was noted during the high level reading subtests and the copywork of single words and geometric forms.

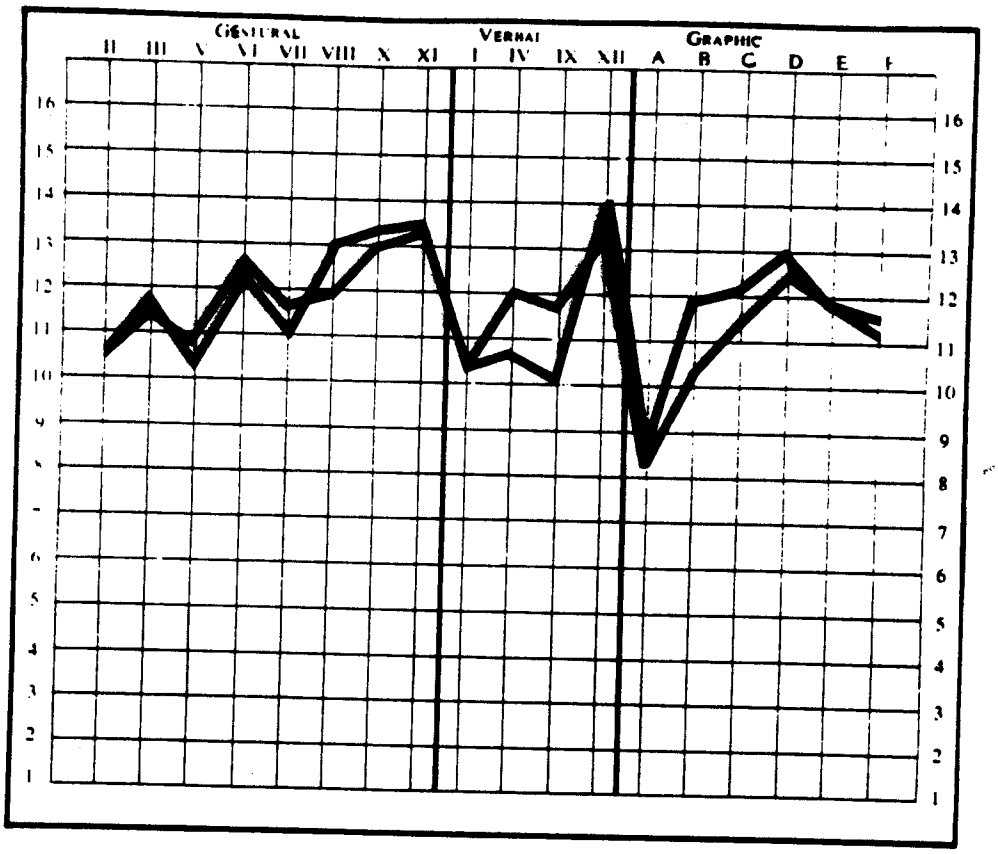

Figure 6. The Modality Response Curve of Dementia Patients.

The area of the brain which is most severely affected by tissue atrophy initially is the limbic system. Severe plaque formation later concentrates in the temporo-parieto-occipital cortex. Therefore, one of the first clinical symptoms observed is a high-level visual perceptual deficit. To observe this, the copywork of single words and geometric shapes is particularly important. The patients may score a 15 consistently throughout testing, and demonstrate difficulty during these tasks. The following characteristics, listed in conjunction with disease severity, were noted during copywork tasks.

Subtest E

1. difficulty with horizontal or vertical lines, as in crossing t (Figure 7)
2. double letters
3. incomplete letters, letter reversals
4. inability to associate written word to written word; reading word and visualizing image (Figure 8).

Porch Index of Communicative Ability

GRAPHIC TEST E

Name _____
Date _____
By _____

TOOTHBRUSH Tooth brush	CIGARETTE c garelle
PEN Pen	KNIFE knife
FORK fork	QUARTER Quarter
PENCIL Pencil	MATCHES mal thes
KEY key	COMB comb

Figure 7. Subtest E Responses of a Dementia Patient.

Subtest F

1. lack of distinction between TVN (Figure 9)
2. poor closure, difficulty with horizontal lines
3. more severe lack of closure (Figure 10)
4. complete lack of closure
5. inappropriate responses

Conclusion. The speech pathologist in a hospital setting observes a large variety of speech and language disorders, a substantial percentage of which involve neurological processes. Knowledge of the physiological characteristics of particular neurological diseases is essential for adequate evaluation and treatment. A complex, quantitative and qualitative language assessment, such as the PICA, may be beneficial in detecting the fine differences in brain damage.

Porch Index of Communicative Ability

GRAPHIC TEST E

Name_____
Date_____
By_____

TOOTHBRUSH	CIGARETTE
PEN	KNIFE
FORK	QUARTER
PENCIL	MATCHES
KEY	COMB

Figure 9. Subtest F Responses of a Dementia Patient.

Porch Index of Communicative Ability

GRAPHIC TEST F

Name_____
Date_____
By_____

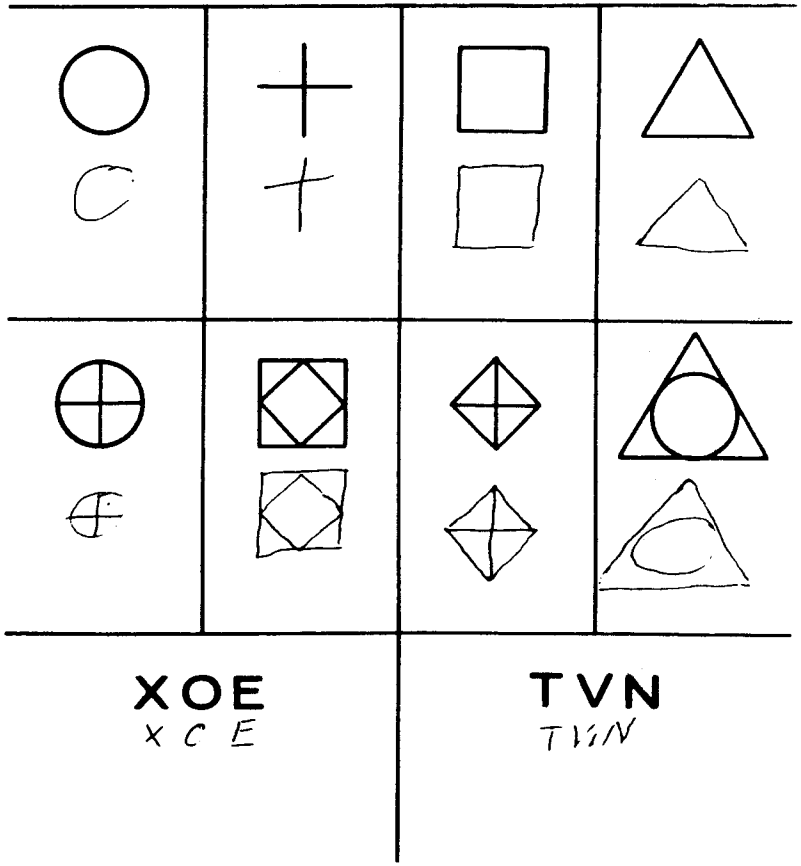

Figure 8. Subtest E Responses of a Dementia Patient.

Porch's work in differentiating types of left hemispheric CVAs is one example of this. Dr. Janice Barnes showed that PICA testing appears to locate the cerebral hemisphere involved in brain tumors. Finally, the results of the study presented here today indicate the ability of the PICA to differentiate Alzeheimer's disease from left CVA.

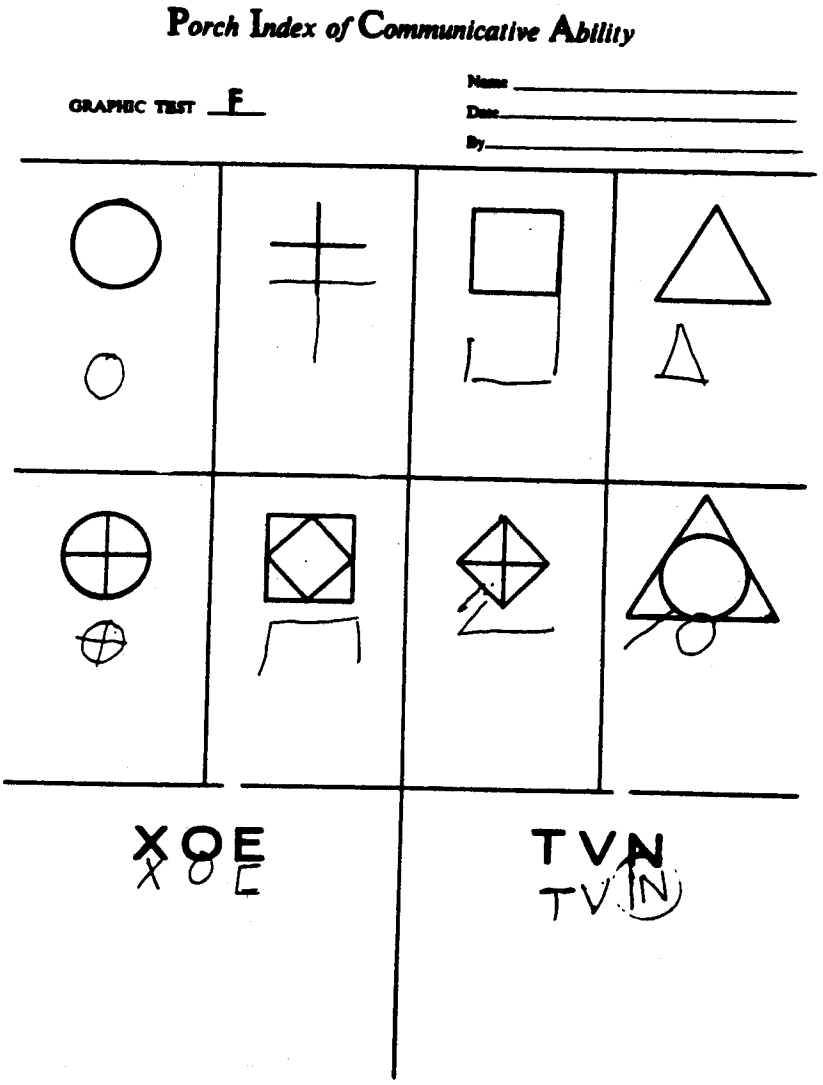

Figure 10. Subtest F Responses of a Dementia Patient.

Q. Was there any difference between the senile dementia group and the Alzheimer's disease group?

A. Today, basically, the diagnosis is the same. Depending upon the physician, the name assigned may be Alzheimer's or senile dementia. The only difference is age at onset. Patients younger than 60 are diagnosed Alzheimer while partly due to old connotations of dementia, patients older than 60 are diagnosed senile dementia.

Q. Would you call the observed behavior aphasia?

A. No, not at the disease level of these patients. The purpose of the study was to evaluate the patients at the time of the diagnosis. However, I did test patients who had progressed in the disease who developed aphasic response patterns. My concern was to identify the fine visual perceptual deficit, and the decline in reading skills, partially attributed to memory.

Q. It appeared to me that your aphasics were fairly involved. There was a predominance of "5s" in scoring. Explain your range and distribution of scores within the aphasic group.

A. The selection of the left CVA group was confined to the initial CVA located strictly in the left hemisphere of patients in acute community hospital.

Q. What was your overall mean score of the aphasic patients?

A. I don't know that off-hand. For purposes of the study, the first 20 patients evaluated with the PICA who qualified, as I previously explained, were included. Therefore, this may have included more low level aphasic patients than high level aphasic patients, but the distribution was fairly even.

Note: For the left CVA group, the following means were computed:

Overall	Gestural	Verbal	Graphic
8.94	10.42	8.95	6.42

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